April 15, 2009

Mary Nichols, Chair
California Air Resources Board
1001 I Street
Sacramento, CA 95814

RE: Comments on Proposed Low Carbon Fuel Standard Regulation

Dear Chairman Nichols,

CALSTART strongly supports the adoption of a Low Carbon Fuel Standard (LCFS) as a discrete early action measure in California's fight against climate change. Though it is somewhat more complicated, the general concept of the LCFS is similar to the Alternative Fuels Portfolio Standard recommended by CALSTART and the California Secure Transportation Energy Partnership (CalSTEP) in its January 2007 Action Plan. We applaud the Air Resources Board (ARB) for their work to date in developing this important, first-of-its-kind policy to reduce greenhouse gas emissions from transportation fuels. Since 2002 and the adoption of the Pavley program, the ARB has been working to reduce tailpipe emissions. An equal or greater amount of technology forcing regulation should now be applied to the fuel sector. The successful and timely implementation of California's LCFS is a necessary component of the broader fight against climate change. The schedule has already been delayed and, given what we now know about rising greenhouse gas concentrations in the atmosphere, further delay would not be prudent.

ARB staff has done a commendable job on the initial analysis and regulatory design, particularly with regard to the detailed calculations of direct emissions associated with the various fuel pathways. We offer the following comments and recommendations to strengthen the LCFS and improve its ability to both reduce emissions in California and serve as a model for a national program. We are providing comments on the following critical issues:

- **Implementation and emissions timeline:** recent warnings from scientific experts make clear the fact that we cannot afford to delay emissions reductions. We urge ARB to move forward with LCFS implementation without delay and to consider how best to encourage near term emissions reductions under the LCFS.
- **Indirect emissions:** the science in this area is new and evolving, and the current regulation only examines one type of indirect effects – land use changes, primarily from biofuel production. Ideally, we would like to see the inclusion of all indirect emissions from all fuels, once the science has evolved and there is greater consensus about the secondary impacts of all fuels. This was the approache chosen by the European Commission.
- **Process for proposing new or modified pathways:** ARB should provide a thoughtful yet efficient and affordable method for stakeholders to propose new or modified inputs for both direct and indirect emissions. Such a process would improve the accuracy of the carbon intensity values while providing an incentive for regulated parties to reduce the direct and indirect emissions associated with their specific fuel pathways. This is particularly important if ARB moves forward with a regulation that includes indirect land use change emissions as currently outlined in the proposed regulation.
- **Models, inputs, and assumptions:** the LCFS is heavily dependent on complex models with many inputs and assumptions. While indirect land use change is the most controversial area, there are additional factors that have not been thoroughly verified. We recommend that ARB continue working to refine and improve upon the underlying pathway analysis at the heart of the LCFS through an ongoing public process. The goal should be to make sure the latest, best science is employed and to validate the models and results as data become available.

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CALSTART believes that a successful LCFS based on sound and scientifically defensible analysis can serve as a model for a similar policy at the national level. It is therefore very important that we "get this right" in California.

Encourage Early Reductions and Avoid Delays

Recent research suggests that policymakers should strive to encourage increased near term emissions reductions. It now appears that the Intergovernmental Panel on Climate Change may have underestimated the impacts of climate change.[1] Furthermore, there is increasing evidence that suggests that the climate change effects of greenhouse gas emissions will be largely irreversible[2] and potentially abrupt. In light of these warnings from the scientific community, there is a clear need to accelerate emissions reductions through intelligent policy choices and timely implementation of climate regulations and programs such as the LCFS.

The LCFS and Complementary Policies Should Encourage Early Reductions

As currently written, the LCFS has a backloaded compliance schedule and a relatively modest end goal. We understand the various constraints that led to this result, but believe that it highlights the need for complementary policies to drive early reductions.

Furthermore, though CALSTART has not done extensive analysis on the subject of accounting for emissions over time, we agree with ARB staff on the need to continue evaluating the Fuel Warming Potential (FWP) method. This method shows promise because it has a scientific basis and takes into account the fact that emissions today are more damaging than emissions tomorrow. However, we understand and agree with ARB's decision to use the simple Annualized method in the early years, as indirect land use emissions debate has not been settled and the FWP method has not yet been adequately peer reviewed. After ARB validates the models and addresses the ongoing concerns over indirect emissions, we would recommend further consideration of the FWP method for time accounting.

The LCFS Should be Implemented without Delay

We commend ARB staff for the large volume of work they have completed to date on fuel pathway analysis and regulatory design. The LCFS is a complex and labor-intensive policy and ARB has done an admirable job of avoiding major delays. As we continue to move through the implementation process, it is important to keep up the momentum, to the extent that the analysis is sufficiently rigorous for regulatory purposes. As mentioned above, we believe the direct emissions analysis is relatively sound and can form the basis of a regulatory program in the early years. Whether or not ARB decides to include indirect emissions at the outset of the program, we stress the need to move forward with some version of the LCFS on schedule. If ARB elects to delay the inclusion of indirect effects to allow for additional study and validation of model findings, we believe the study should move forward quickly and the indirect effects should be incorporated as soon as possible.

Study and Account for Indirect Emissions from All Fuels in a Consistent Manner

The issue of indirect emissions in general and emissions from indirect land use change in particular has probably been the most controversial aspect of this process to date. The science in this area is new and evolving, but it is clear that indirect emissions deserve further consideration and should not be ignored. CALSTART commends ARB staff for attempting to address this difficult issue in assigning carbon intensity values to fuels for

[1] "Projections of Climate Change go from Bad to Worse." Science, March 20, 2009. http://rael.berkeley.edu/files/IARU-Coverage-Science-March24-2009.pdf

[2] "New Study Shows Climate Change Largely Irreversible." NOAA press release, January 26, 2009. http://www.noaanews.noaa.gov/stories2009/20090126_climate.html;

the LCFS. In the words of MIT Professor John Reilly, one of the peer reviewers for the LCFS, "this is a very new area where research that could establish with confidence such indirect emissions is in its infancy. Ideally one would like to have had the scientific community investigate these issues and to have published competing estimates, resolving among them better or worse approaches and identifying uncertainties."[3] Given the timeframe and the available data, ARB has had to move forward without this luxury. While the work done around indirect effects for the LCFS has clearly advanced the science in this area, there is more to be done.

The Science Regarding Indirect Emissions is Still Uncertain

The scientific arguments on both sides of this issue are well-known and we will not rehash them here. It is important to note, however, that there is a general lack of consensus and that the resistance to staff's approach on this issue is coming from the scientific community as well as from many elements of the biofuels industry.[4] Even some of those who strongly support the inclusion of indirect land use emissions from biofuels production admit that there may still be some uncertainty over the magnitude of the effect.

ARB Staff's Initial Statement of Reasons (ISOR) indicates that the staff is confident about the direction of the effect. However, the ISOR underlines the uncertainty surrounding the actual quantitative estimates of indirect land use change emissions, stating that "the tools for estimating land use change are few and relatively new"[5] and that "although one may argue that there is no scientific consensus as to the precise magnitude of land use change emissions and that the methodologies to estimate these emissions are still being developed, scientists generally agree that the impact is real and significant."[6] CALSTART is not disputing the claim that these effects are real. However, we are concerned that the actual methods, models, and resulting effect magnitudes may not yet be sufficient for regulatory purposes. We are particularly concerned with the ability of the GTAP model to accurately predict the effect of domestic biofuel production on foreign land management practices and international agri-business investment decisions.

ALL Indirect Emissions Should be Included once the Numbers are Better Understood and Independently Evaluated

The LCFS should create a level playing field that allows fuels to compete with each other on the basis of life-cycle emissions. As proposed, however, the LCFS includes indirect land use change emissions from biofuels but does not include any other indirect effects. The ISOR notes that "staff has identified no other significant effects that result in large GHG emissions that would substantially affect the LCFS framework for reducing the carbon intensity of transportation fuels."[7] However, given the small differences in relative carbon intensities between the various fuels and the uncertainty as to the magnitude of indirect land use change emissions, CALSTART is concerned that the inclusion of indirect effects on a selective basis could undermine the integrity of the LCFS. If ARB staff has reason to believe that indirect emissions from other fuels such as conventional gasoline and diesel are negligible or nonexistent, we would encourage staff to make this analysis publicly available.

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[3] "Review of Proposed Regulation to Implement the Low Carbon Fuel Standard." Peer review of John Reilly, Senior Lecturer, Sloan School of Management, MIT. http://www.arb.ca.gov/fuels/lcfs/peerreview/041409lcfs_reilly.pdf

[4] For example, 111 PhD researchers recently wrote a letter to Governor Schwarzenegger stating their opposition to selective enforcement of indirect effects in the LCFS, and noting that "the science is far too limited and uncertain for regulatory enforcement." http://www.arb.ca.gov/lists/lcfs-general-ws/28-phd_lcfs_mar09.pdf

[5] LCFS ISOR, X-5

[6] LCFS ISOR, IV-48.

[7] LCFS ISOR, ES-29

CALSTART believes that the LCFS should ultimately include all emissions (direct and indirect) from all fuels, particularly if sound analytics can be adopted for accurately estimating the secondary impacts. We are concerned that selective enforcement of indirect effects may create the appearance of a bias that could potentially hurt the chances of broader adoption of the California model. We believe that the lack of readily available models and estimates for indirect emissions from other fuels is an argument for additional study, within a strictly time limited period, rather than an argument for assuming a value of zero. We commend ARB staff for stating that they "will continue to work with interested parties to identify and measure [other indirect] effects,"[8] and believe that a thorough and rigorous independent analysis is the best way to address these issues. Whether or not indirect effects are included at the outset of the regulation, we recommend moving forward with a comprehensive and independent analysis of indirect effects as soon as possible.

CALSTART has not done extensive analysis of the direct and indirect emissions from conventional fuels and we do not have hard data to present. However, if ARB is going to look beyond direct emissions and make assumptions about how economic activity in the USA will drive economic behavior in other countries, there are a number of greenhouse gas impacts associated with the carbon intensive incumbent fuels that deserve attention. Below are some examples:

- Oil exploration: it is our understanding that direct emissions from oil exploration are not included in the carbon intensity calculations for petroleum-based fuels
- Military protection of oil supplies: many economists have attempted to quantify the costs of protecting oil supplies in the Persian Gulf. One estimate from researchers at UC Davis' Institute for Transportation Studies put the annual economic costs of military operations tied to defense of oil supplies at $ 26.7-73.3 billion, with $5.8-25.4 billion of this tied directly to the cost of defending the use of motor oil by U.S. vehicles.[9] The emissions from these large scale military operations would be difficult to quantify, but that does not mean they should be ignored.[10] Even more controversial and difficult, but no less real, are the carbon emissions associated with global conflict over energy. Clearly there was a carbon impact when the Iraqi Army blew up the wells in Kuwait during the first Gulf War and fires raged for weeks thereafter. When such conflicts occur, will the emissions be factored into the respective inventories and models?
- Indirect, "spill-over" emissions from petroleum: changes in the price of oil are likely to have far-reaching impacts on a variety of markets and actors worldwide. Emissions resulting from this would be difficult to quantify because of the degree to which oil touches all aspects of our economy, but this does not mean these effects are not real.

These are just a few examples of the types of effects that we think should be examined. There certainly may be others.

Additional Work is Needed to Get this Right

CALSTART recommends that ARB commission a rigorous and comprehensive study of indirect emissions from all petroleum-based and alternative fuels through an independent and well respected body such as the National Academy of Sciences. To avoid the pitfall of paralysis by analysis, we recommend that such a committee be given a defined period of 12-24 months to report back. The Energy Independence and Security Act of 2007

[8] LCFS ISOR, ES-29

[9] "U.S. Military Expenditures to Protect the Use of Persian-Gulf Oil for Motor Vehicles." Mark Delucchi and James Murphy, April 1996, revised March 2008. http://www.its.ucdavis.edu/publications/2004/UCD-ITS-RR-96-03(15)_rev3.pdf

[10] Former U.C. Berkeley Professor Alex Farrell, who was deeply involved in the life-cycle calculations underlying the LCFS, agreed in a private conversation with John Boesel in February 2008 that "such emissions probably should be included" in the LCFS.

highlighted the need for additional work in this field as it relates to biofuels, and indirect emissions from other fuels are even more uncertain.[11] If the study could be completed quickly, ARB could implement the LCFS in two phases, beginning with direct effects only and including the indirect effects after the completion of the study. While we think this phased approach has merits, we understand that this delay could be problematic and that ARB is likely to move forward with a regulation that includes indirect land use change. Even if this is the case, we believe it is important to proceed immediately with an independent review of indirect effects for all fuels, with the goal of updating and refining the carbon intensity values as the science evolves. Regardless of the approach taken, we don't recommend the ARB delay any further in implementing the program. It is time to move forward.

We are aware of the fact that some may view our position and recommendations on indirect emissions as a delay tactic designed to support the ethanol industry in the early years of the LCFS. CALSTART is a fuel- and technology-neutral organization with no particular interest in supporting the ethanol industry at the expense of the environment or other alternative fuels. Rather, we believe this study would improve the analysis underlying the LCFS, address legitimate stakeholder concerns, and increase the chances of a broader adoption of the California model.

Create a Thorough and Efficient Process for Proposing New or Modified Pathways

CALSTART commends ARB staff for including in the regulation processes for modifying model inputs to reflect specific processes (Method 2A) and for creating new fuel pathways (Method 2B). CALSTART believes it is imperative that these processes apply to indirect emissions as well as direct emissions. The language in the ISOR refers only to new or modified inputs for direct emissions, but ARB staff mentioned in the March 27th LCFS workshop that they saw the need to "provide a path forward" on the indirect emissions side as well. Staff indicated that they would create a process for stakeholders to get credit (in the form of a reduced carbon intensity value) for demonstrated reductions in indirect emissions, perhaps through an expanded Method 2B.

Such a process is vitally important to the success of the LCFS, especially in light of the fact that ARB is likely to move forward with a regulation that includes controversial estimates of emissions from indirect land use change. This process would both improve the accuracy of the carbon intensity values and provide an incentive for regulated parties to reduce the direct and indirect emissions associated with their specific fuel pathways. From a practical standpoint, the process will be much more effective if it is quick, efficient, and transparent. If ARB is able to incorporate such a process in to the regulation, this should help to address some of the concerns of biofuel producers and should also improve the overall public perception of the regulation.

Continually Work to Improve and Validate Models, Inputs, and Assumptions through a Transparent Public Process

The LCFS is dependent on complex models with many inputs and assumptions. Given the nature of the regulation and the available data and models, the LCFS represents a departure from past ARB regulations. Other ARB models and programs had some scientific uncertainty, but this program stands out due to the modeling constraints and

[11] EISA 2007 directs the Secretaries of Agriculture and Energy to carry out a Biomass Research and Development Initiative focused on, among other things, "the improvement and development of analytical tools to facilitate the analysis of life-cycle energy and greenhouse gas emissions, including emissions related to direct and indirect land use changes, attributable to all potential biofuel feedstocks and production processes." EISA, Title II, Subtitle B, Sec. 232(b)(3). http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=110_cong_bills&docid=f:h6enr.txt.pdf

assumptions, the scarcity of data for some of the key inputs, and the relative lack of real world validation of model results.

The most obvious area of potential disagreement is indirect land use change. The LCFS relies on relatively new science and models that are intended to predict the outcomes of international economics and human behavior. Given the lack of consensus and the changes in ARB's indirect emissions estimates over the past several months, we expect to see ongoing work in this area. For example, Professor Valerie Thomas noted in her official peer review of the LCFS, "that observed data have not been used to validate the GTAP model findings is a significant weakness. The changes in corn production resulting from the federal renewable fuel standard, and the change in Brazilian sugar production resulting from increased ethanol production should be measurable, and should be measured to validate the model assumptions. The ARB model should be adjusted to reflect data."[12]

While ARB's estimates of emissions associated with indirect land use change have generated the most debate, CALSTART notes that there are other areas of uncertainty that deserve additional attention. One factor that can easily tip the balance between various fuels is the Energy Economy Ratio (EER). Like indirect land use, this area has generated disagreement and a wide range of estimates. ARB staff admits that "the data are relatively limited" for establishing EER values for advanced and emerging vehicle technologies.[13] Professor Linsey Marr outlines many important issues related to EER calculations and assumptions in her peer review of the LCFS.[14] The co-product credit is another factor that deserves additional scrutiny.

Given the degree to which the success of the LCFS relies on accurate models and inputs, we urge ARB to put into place a thorough and rigorous process for refining and improving the underlying analysis. This process should be transparent and open to public participation. Ongoing dialogue and stakeholder input should help to improve the underlying analysis as well as the public perception of the LCFS program.

CALSTART thanks the ARB for the opportunity to provide input throughout this rulemaking process.

Sincerely,

John Boesel, President and CEO

[12] "Review of Proposed Regulation to Implement the Low Carbon Fuel Standard." Peer review of Valerie Thomas, Associate Professor, School of Industrial and Systems Engineering, Georgia Institute of Technology. http://www.arb.ca.gov/fuels/lcfs/peerreview/041409lcfs_thomas.pdf

[13] LCFS ISOR, ES-18.

[14] "Scientific Review of the California Air Resources Board's Proposal to Implement the Low Carbon Fuel Standard." Linsey Marr, Professor of Civil and Environmental Engineering, Virginia Tech http://www.arb.ca.gov/fuels/lcfs/peerreview/041409lcfs_marr.pdf